

The kidney is approached through either a midline or a flank incision with circumferential dissection of the renal artery and vein. After they are transected, the kidney is removed from the renal fossa and placed on continuous hypothermic perfusion on a dissecting platform. A reconstruction procedure can then be done in an asanguineous field, with optimal exposure and illumination, using microvascular surgical technique. Following repair, the kidney can be replaced in either an orthotopic or a heterotopic position in the iliac fossa. Although an autogenous saphenous vein is an acceptable graft for renal artery substitution, we prefer the branched hypogastric artery because of its anatomic configuration and size, its resistance to aneurysmal degeneration or stricture and its growth when implanted in a growing child.

Although most of the surgical literature on this subject comprises case reports, we have followed for periods of six months to six years 26 patients who underwent ex vivo repairs. Of 23 reconstructions, 22 were patent as determined by postoperative angiography. In all, 95% of the hypertensive patients were cured or their conditions improved during follow-up. Late postoperative arteriograms (more than three years) showed continuing patency in all six patients studied.

The ex vivo "bench work" operation, a relatively recent addition to vascular surgical procedures, has, by preserving kidneys and their important function, provided a significant contribution for patients affected with a variety of complex lesions.

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## Preoperative Biliary Tract Drainage

DURING THE 1970S, numerous authors reported that percutaneous transhepatic drainage could be done with little morbidity. During this same period, surgical relief of obstruction in severely jaundiced patients was associated with postoperative morbidity in 40% to 60% and mortality in 15% to 25% of patients. For this reason, preoperative percutaneous transhepatic drainage has been recommended for these patients. Moreover, two retrospective studies from Japan and another nonrandomized analysis from Ohio State University suggested that preoperative biliary tract drainage might be helpful. Thus, on the basis of these retrospective studies, many clinicians have accepted that preoperative biliary drainage should be done routinely before surgical intervention in patients with deep jaundice. However, more recent reports from several institutions have cautioned that a significant proportion of patients undergoing this procedure are subject to both early and late complications.

Thus, controversy exists as to what role preoperative biliary drainage should play. To help answer this question, three prospective randomized studies have recently been completed. The first such study was done by Hatfield and associ-

ates from South Africa. These investigators failed to find any advantage in terms of decreased postoperative morbidity or mortality for preoperative percutaneous transhepatic drainage: 4 of 29 patients (14%) who had drainage and 4 of 28 (14%) who did not undergo drainage died. Five of the eight deaths, however, occurred in patients in whom either percutaneous transhepatic drainage could not be done (one patient) or who did not have a surgical procedure (five patients). The second study was done at the Hammersmith Hospital in London by McPherson and co-workers. In this study, of 65 patients, hospital mortality was actually higher in the drained (32%) than in the undrained (19%) patients ( $P > .05$ ). Of 11 deaths in the drained group in this study, 5 occurred in patients who did not have an operation.

The third study was done at the UCLA Medical Center. In this study of 75 patients, hospital mortality was 8% among drained patients and only 5% in those patients who had surgical treatment without preoperative percutaneous transhepatic drainage. In both this study and the Hammersmith study, no significant differences in postoperative morbidity were noted between the drained and undrained patients. Moreover, in both of these studies the duration of hospital stay was significantly prolonged ( $P < .05$ ) in the patients who had preoperative biliary tract drainage. Thus, although retrospective analyses suggested that preoperative percutaneous transhepatic drainage might be beneficial, prospective studies have not supported this early enthusiasm. One criticism of each of these prospective studies, however, is that the duration of preoperative drainage (10 to 18 days) may not have been sufficient to reverse the multiple metabolic and immunologic abnormalities associated with severe obstructive jaundice.

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## Percutaneous Abscess Drainage and Related Radiologic Procedures

PERCUTANEOUS DRAINAGE PROCEDURES continue to evolve with new and innovative advances. Abscesses that previously were not considered appropriate for catheter drainage may be cured in some cases, while needle puncture of certain fluid collections and organs that had been assiduously avoided now is done safely and with clinical benefit. Progress has accrued from laboratory work, improvement in techniques and the necessity of application in desperately ill patients with no reasonable alternatives.

Unilocular (or bilocular) and relatively superficial abscesses are drained with catheters successfully in about 90% of cases. Because of superior resolution, computed tomography (CT) is used for guidance in most cases. The use of large, multihole sump systems, an adequate number of catheters and copious irrigation has now made this a routine procedure. Some hepatic abscesses, those in superficial abdominal

sites, and abscesses in extremities (such as in the thigh) are drained under sonographic guidance.

Enteric-related abscesses have been drained successfully or reduced by partial drainage. Thus, appendiceal abscesses, peridiverticular abscesses, Crohn's-related abscesses and perianastomotic abscesses are amenable to percutaneous abscess drainage. Cutaneous fistula formation after catheter drainage of Crohn's disease abscesses has not been reported to date. The goal of percutaneous treatment for periappendiceal abscesses is to allow a patient's condition to "cool down" and thus to simplify the surgeon's task at a subsequent appendectomy. With enteric-related abscesses, longer term catheterization (several weeks) is often required, compared with unilocular uncomplicated abscesses (about five to ten days).

Patients with pancreatic abscesses and pancreatic pseudocysts have been treated successfully in some cases and improved in other cases. Failure of percutaneous drainage generally occurs when too few catheters are placed or they are removed too quickly. For successful pseudocyst drainage, the communication to the disrupted pancreatic duct must seal, and antegrade obstruction of the duct must resolve. Transgastric placement of catheters for percutaneous drainage has been advocated by some. Successful pancreatic abscess drainage usually requires more than one catheter because the collections are frequently multiloculated; similarly, more follow-up studies (sinography, sonography and CT) are utilized for close follow-up and additional catheter maneuvering, if necessary. These are tedious, prolonged drainages but are frequently helpful in critically ill patients.

Amebic abscesses are drained in a minority of cases. Specific indications for percutaneous abscess drainage include the following: to differentiate pyogenic from amebic in an acute situation, clinical deterioration while receiving medication, initial false-negative serology, pain and imminent rupture and left lobe abscesses. Ultrasound may be used for guidance in some of these cases.

Collections in the chest that are not drained successfully by standard tube thoracostomy due to tube malpositioning may be drained by CT- or ultrasound-guided percutaneous drainage. Some of the most dramatic cures of purulent collections are achieved with catheter drainage of empyemas or infected pericardial collections. When lung abscesses do not have adequate bronchial drainage, they too may be drained by percutaneous catheters. These catheters are preferentially inserted through areas of previous pleural contamination, so as not to spread infection to uninvolved pleura.

Drainage of hematomas, lymphoceles and benign cysts has also been accomplished percutaneously. Each of these is complicated by various specific problems: hematomas are quite thick, lymphoceles tend to recur due to leakage of small lymphatics and cysts may recur due to persistent mucosal secretion. The last may be sclerosed in some cases through the percutaneous catheters.

Percutaneous radiologic-guided puncture of the stomach for feeding or decompression is an outgrowth of percutaneous drainage techniques. It is done under fluoroscopy, with preprocedure location of the transverse colon and sonographic identification of the left lobe of the liver to avoid inadvertent puncture. Catheters are placed directly into the stomach after

insertion of a nasogastric tube and inflation of the stomach with either an intragastric balloon, fluid or air. Catheters may be placed either into the stomach or through the stomach into the small bowel for more distal feeding or decompression.

Percutaneous puncture of the gallbladder is used for biliary tract decompression for malignant obstruction, temporizing cholecystostomy for cholecystitis and empyema of the gallbladder or as an access for stone removal. *Echinococcus* cysts, once considered taboo to puncture, have now been reported to have undergone successful percutaneous drainage. The *Echinococcus multilocularis* cyst apparently can be punctured safely, whereas the *Echinococcus alveolaris* type has associated anaphylactic risk.

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## Anal Sphincter-Saving Operations

SELECTED CASES of rectal cancer, chronic ulcerative colitis and colonic polyposis may be treated today with sphincter-preserving operations. In the past, many of these patients would have had complete excision of the rectum with a permanent ileostomy or colostomy. Enthusiasm and interest in new techniques for sphincter preservation arise from a better understanding of the various diseases, an improved appreciation of sphincter physiology and the continued desire of patients and physicians to preserve sphincter function, thereby avoiding a permanent stoma.

Rectal cancer involving the upper third of the rectum is conventionally treated with a low anterior resection with anastomosis. However, tumors involving the middle and lower thirds of the rectum have more often been treated by abdominoperineal excision of the rectum. Extended low anterior resection is today done for many of these tumors in the lower rectum provided an adequate margin distal to the tumor can be obtained (2 to 5 cm). Wide excision of the surrounding tissues and retrorectal lymphatics is important to achieve local control.

The development of new intraluminal stapling devices has aided technically in carrying out low rectal anastomosis or coloanal anastomosis done transanally. A temporary diverting colostomy may accompany these low restorative resections to protect the patient if an anastomotic leak should occur. In addition, cancers involving the lower third of the rectum may be selectively approached transanally by excising locally or fulgurating. Criteria for this approach include tumors that are exophytic, well differentiated, mobile and of relatively small size. Caution in these approaches must be stressed in order not to sacrifice principles of adequate cancer surgical treatment, thereby risking local recurrence. To date, results of sphincter-saving procedures for rectal cancer that include